PROPOSED COMPUTER BASED TRAINING FOR THE MINNESOTA ARMY NATIONAL GUARD

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ABSTRACT

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The purpose of the study is to research computer-based training (CBT), which could prove to be an effective substitute for instructor based training (IBT) in the Minnesota Army National Guard. The effects of training in the military are significant to the overall mission, and therefore the training must be flexible. This becomes an issue for the units because of the high rate of absenteeism throughout the National Guard. The problem stems from the conflicts of civilian life, which prevent soldiers from attending the weekend drill. This training is then made up at some point during the week, when the soldier is able to attend. When a soldier misses training, the make-up training is often put off or not received. The soldier's time is usually spent performing administrative duties, such as; filing, faxing, typing and sending newsletters.

Computer based training which could prove to be effective, is an alternative to the training missed during the month. The CBT allows for the training to be done at their own pace, adjusting to their schedule and they are able to learn at their own rate. The

study will be conducted using a sample size of 38% of the soldiers. The computer based CD will be designed prior to the study using Macromedia© and encompass multimedia to enhance the learning process.

From a sample group developed by a table of random numbers, 50% of the soldiers will receive the instructor based training and the other 50% of the soldiers will receive computer-based training. When the soldiers have completed the training, they will assemble in a classroom and a paper/ pencil test will be administered to the entire sample population.

The results of the test will be evaluated and used in drawing conclusions from the research. The results should indicate if the computer-based training is as effective as the instructor- based training.

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There are many individuals to whom I would like to thank for all the support and help throughout this field study.

First, The University of Wisconsin- Stout Student Research Fund Grant for providing me with the finances which allowed for many supplies to be purchased and covered costs incurred during the creating and administering of the Computer Based Training, which is training designed on a CD ROM, instead of through the use of an instructor. The E company 434th Main Support Battalion, for providing support and personnel to conduct this research study. The instructor Sergeant Jenkins, who willingly took on the responsibility to conduct IBT, when training was not mandatory. Also, the 40 enlisted personnel from E 434th MSB for voluntarily participating in the research study.

This research paper is dedicated to many special people in my life. Without the help of my fellow colleagues, friends and staff in the College of Human Development, the creation of the CD would not have been possible. The technical support: Kom Campiranon, Timothy Johnson, and Jeffrey Holland. Not to dismiss the appreciation of the secretarial staff, Donna Muenich, Ella Huttner, Jean Hince and Laurie Olson. Joe Holland, my mentor, boss, advisor and friend. For the many countless hours of editing, designing and focusing me on my research.

Finally, to my father, Ron Soplata, from whom I learn so much and to whom I owe so much.

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CHAPTER 1

INTRODUCTION

The training that is conducted during each month of the year must be used wisely and in a time efficient manner for E Company, 434th Main Support Battalion (MSB). Training the soldiers is vital to the overall mission of the entire infantry division. Because of the schedule conflicts and time constraints of civilian life, soldiers are not always able to attend each month and therefore miss important training. During the course of the month this training is to be made up by the soldier when time permits. Soldiers are often assigned to tedious tasks such as filing, typing, sealing envelopes and sending out newsletters. Therefore, the soldier does not receive the training that fellow comrades have received during the weekend drill training.

When training is conducted only one weekend a month and the soldier is not able to attend, absence from 3 or more training sessions makes the training within the unit unstable. Therefore, an alternative training program for those soldiers who are absent could provide beneficial results for the company.

E Company/ 434th Main Support Battalion is located in Cottage Grove, Minnesota, and is part of the 43rd infantry division in the Minnesota Army National Guard. The Company is comprised of 14 officers and 105 enlisted personnel. The mission of the Main Support Battalion is to provide direct support to division units in the division rear and designate and reinforce support to the Forward Support Battalion (FSB). The Main Support Battalion is the division's logistics and medical operator in the division rear. Commanding, controlling and coordinating many elements within the Main Support Battalion gives a diverse mission to the organization, presenting many challenges within

the lower echelon. The soldiers of E company have to be not only proficient in soldier skills, but they must also provide medical support to the division to the highest level necessary to complete their job.

The Statement of the Problem

This researcher proposes comparing the effectiveness of CD Computer Based Training (CBT) to Instructor Based Training (IBT) for a military organization. This research will compare the instructor-based classroom training currently being used to an interactive computer- based program. The results will be analyzed to determine if CBT can provide a substitute training for soldiers that are absent during the classroom training.

The Subproblems

1. The first subproblem. The first subproblem is to identify the benefits of computer- based training using a CD.
2. The second subproblem. The second subproblem is to determine the effectiveness of computer- based training within an organization.
3. The third subproblem. The third subproblem is to determine the methods of CD computer- based training that are most effective to the training environment and modules.

The Hypothesis

The first hypothesis is assuming the intelligence level of the soldier will enable him to use this technology without additional training.

The second hypothesis is the cost effectiveness of the CBT to the unit.

The third hypothesis is whether the learning acquired thru CBT is equivalent to that acquired by IBT.

The Delimitations

This study will not look at gender disparities in CBI.

The soldiers will not be evaluated on knowledge of the subject prior to the training.

This study will be limited to the National Guard service members of F Company, 434th MSB.

Assumptions

The first assumption. Computer-based instruction will be time efficient for the military.

The second assumption. Soldiers will be cooperative of the study.

The third assumption. CBI training will improve the scope of the training.

The Definition of Terms

Soldier. A person serving in uniform who follows rules and regulations for the armed services.

Computer Based Training. Training that is done interactively, by a person or persons, with the use of a computer.

Unit: A group of people within the same organization that assembles on a regular basis.

Military Service Members: Soldiers serving the Minnesota Army National Guard, wearing a military uniform on a one weekend a month basis.

Rank: The grade and position which the soldier holds for service in the army or other armed forces.

Split- Training: Making up training at a time other than the regularly scheduled training hours.

Main Support Battalion: Military battalion which provides support to all areas of the division on the battlefield.

Forward Support Battalion: Military battalion which provides support to all the forward elements on the battlefield.

Division: A division of a military

Echelon: A subdivision of a military or naval force

Training Environment: The room or environment in which training is being conducted.

Abbreviations

1. CD: Computer disk.
2. CBT: Computer-based training.
3. IBT: Instructor-based training
4. MSB: Main support battalion.
5. CTT: Common Task Training
6. FSB: Forward support battalion
7. SSG: Staff Sergeant
8. SPC: Specialist
9. PFC: Private First Class

The importance of the study

This study is important because of the loss of training in E company/ 434th MSB; the absenteeism exceeds 40% quarterly. (Miller, David. Mar 2001) Training is necessary to keep the company successful and effective in its job. Many split-training sessions

involve administrative tasks, rather than completing competencies of the missed training sessions. Therefore, an effective alternative for the delivery of training will be of great benefit in assuring higher levels of performance from the unit personnel. Since training is vital to the mission of the organization, finding alternatives is necessary to provide quality training. The results of the study can potentially be duplicated and used in many other training situations for the military.

CHAPTER 2

REVIEW OF LITERATURE

Introduction

The review of literature will include three areas: (a) comparing (IBT) Instructor Based Training to (CBT) Computer-Based Training, (b) assessing the effectiveness of computer based training in organizations, and (c) exploring different methods of computer and instructor based training. The present review is limited to investigations in a business and medical organization, or military training methods using computer-based training. Studies done on any other type of computer-based training are excluded.

Design

In comparing IBT to CBT, I will examine the training methods most appropriate for learning. The CBT requires instructional software, appropriate computer hardware and the soldier. IBT on the other hand has multiple students, a training manual or training guide, possible media equipment and the instructor. The analysis of these training methods does point out the obvious; instructor based training requires more elements to be useful. If you eliminate one of these elements from the equation, it is hard to conduct the training session. The contents may change because of different instructors each time the training is given. Even though the IBT requires more elements for training, it's hard to replicate IBT consistently because there are so many elements under the control of the instructor.

Advantages

CBT Advantages

The major benefits cited in other works that favor CBT are; increasing flexibility for the unit, facilitating the unit's general training requirements, assisting minimal-crew cutters, enhancing the training process and benefiting individual student (Hammel, 1998). CBT has many advantages, primary among them is allowing learning at your own pace and at your own time. One advantage of computer-based training is the ability to replicate training consistently each time the training is given; therefore the standards are the same each time. CBT accommodates different learning styles and the idea that people learn at different paces. With CBT the soldier can repeat the program as often as necessary to reach the desired retention level. Another advantage of the CBT is the ability to continue at your own pace. Faster learners can proceed quickly, slower learners can move through the contents more slowly until they adequately understand the material. Instructors often focus on the slower student in the class, resulting in the faster learners becoming bored. "In 1990, the institute for Defense Analysis found that multimedia training takes 31 percent less time than equivalent classroom instruction" (Lewis, 1999) The time reduction from the classroom is contributed to the slower learner in the classroom. Interaction between the learner and the content is one of the greatest strengths of CBT. The CBT should have some type of multimedia, consisting of pictures, diagrams and video segments, to keep the soldier interested in the training (Benson, Steven Feb. 2000).

IBT Advantages

IBT also has many advantages. Instructor Based Training allows for the most learner feedback and media richness. IBT allows for more opportunities to observe and interpret body language, and facial expressions. This input is used by the instructor to adapt the training process to a particular audience. Many learners need a structured environment for effective learning.

Some people will always need to learn and express their ideas face to face, to solve problems or offer solutions. Also, there will always be a need for the kind of human contact and interaction that is best achieved in the classroom (Sims, Doris. Nov. 1996). With IBT the initial cost of training is not as high, it is easy to update changes when they are minor and there are also many years of research that support the effectiveness of the instructor based training.

Disadvantages

CBT disadvantages

One major disadvantage of CBT is the elimination of an instructor or facilitator. If the soldier is having problems understanding the material, he/ she is not able to discuss the problem with the computer. If the soldier is not proficient with a computer or the software being used, he/ she may not be able to participate effectively in the training. Facilities where the training is being conducted must be equipped with the proper hardware to enable the training.

Prior studies within the military have shown there are many obstacles to the effectiveness of computer-based training. “The student responses suggest that at least

several student groups experience training environmental difficulties during their participation. Threats to implementation of effective CBT include unit flexibility, training time and scheduling, student interruptions, the training environment, lack of hands-on training, motivation and training quality assurance" (Hammel 1998).
In a study conducted by (Craig Williams & Hyder Zahead, December 1996) a large pharmaceutical manufacturing site in East North Carolina shows that according to the adult learning theory, adults prefer a high degree of learner control. IBT is an example of very low level of learner control because the instructor controls the learning. The format is predefined; the instructor follows a given agenda and deviates little from the outline. (Harp, Taylor & Satzinger, Aug. 1998) IBT is inflexible in regard to time and place, the students, instructor and training materials must all be available at the preset times.

Computer based training in organizations is performed in a variety of ways. A study was conducted as a field experiment to evaluate the impact of IBT versus CBT on employees' performance (Desai, Eddy & Richards, 1997). The findings indicated that the major differences between IBT and CBT subjects were attributed to the performance, enrollment for the classes, motivation and general attitude toward training methods, and satisfaction with the facility.

Another disadvantage of CBT is it lacks the ability to teach or monitor social skills or interaction. CBT makes it impossible to teach in the abstract, allowing conversation between two people. You may be able to use some sources of multimedia for simulations, but IBT presently can use richer multimedia. Therefore, some situations for training may not be appropriate for the use of CBT.

Cost Effectiveness

The start up cost of CBT is initially much greater than the cost of IBT (see appendix A & B). However, the same multimedia and software can be used to create new courses. The longevity or shelf life of the Common Task Training CBT is eternal. The CTT was established as basic skills for all soldiers, so when the CBT is created the course will not have to be updated. Therefore, when the CBT is created for the army, the initial cost is the entire cost of the training.

"Training cost reduction, while maintaining effectiveness, is of concern to many federal government organizations. Computer Based Training and other training technologies provide opportunities to re-structure the training system, and achieve substantial cost- effectiveness gains"(Hammel, 1998). The ability to provide training that is as effective or more effective than instructor led training is of vital importance this organization. Initially the cost of CBT is high because of factors such as software, hardware, design, development and time in production. This cost is then spread out over time since it can be used at many sites, over the course of a long period of time and still remain an effective tool for training.

CBT is anytime anywhere instruction. The soldier can engage the learning process at times and places convenient to his/ her own schedule. You have the ability to "retake lessons at your convenience" and as many times as needed (Computer Training, 2000) providing the same results.

Conducive Training

"Comparative research has some value if we recognize that the differences in effectiveness and efficiency are due primarily to the way in which the CBT is designed,

and not to the mere fact that the training is on a computer" (PLATO, 2001). The CBT must actively engage in the process of learning; this forces the learner to pay attention and allows him/ her to control the rate and level of the learning process. "If the learner is engaged in the CBT and is an active participant he/ she is also more motivated and likely to retain more of the course material. Well designed interactive courseware can permit training to occur faster, cost less and potentially make school personnel more productive than equipment intensive, hands on training" (RAND, 2001). Some of the characteristics of the best CBT learning designs include: Interactivity, which requires students to take actions that depend upon comprehension. Adapting; adjusting the rate or level of training presentation to the student's comprehension; Simulation, real-world situations and demanding problem solving, applying the learned principles; Stimuli (animation, video, audio, text graphics, hot spots), to enrich the presentation and appeal to varying interests of students; Reliable/ credible information stemming from a trusted source (Lewis, 1999).

Another important aspect in the design of the CBT is the ability to give the learner immediate feedback on the training. The learner may sit in class and not speak up or question information being presented by the trainer, or may become disengaged. By designing interaction and immediate feedback into the CBT, you can help focus the student and maintain learning effectiveness (selection of CBT, 2001).

Lack of Evidence

There is lack of supportive evidence to allow the researcher to compare learning efficiencies between CBT and IBT. There are many publications, but actual research that has been administered on the cognitive results of the effectiveness or determinations that

one is more effective than the other in learning situations, is scarce. Most of the research is found in anecdotal references regarding effectiveness. The research has not found a study that measures the actual effectiveness of CBT compared to IBT.

CHAPTER 3

METHODOLOGY

Introduction

This study is done to compare the effectiveness of computer-based training to instructor- based training in a military environment. In order to do the comparison, the researcher had to create a CBT and design a test booklet that would establish the standards the military requires. The researcher also had to develop a system to conduct the test that would allow the collection of unbiased data. Upon completion of the CBT and the testing booklet, the instruments will be piloted one week prior to the delivery to ensure validity and reliability.

Sample

Two sample groups will be developed with the use of a table of random numbers, and members of the groups will be selected at random using the last four digits of the soldiers' service identification numbers. Research designs often require the use of random sample-selection procedures. Randomization techniques are used to select samples from larger populations and to assign sample members to experimental treatment and control groups. Randomization is a method of maintaining research objectives while reducing the probability that research results will be tainted by unknown random intervening variables (Schlenker, Richard M. June 1996).

The first group will include members who attend instructor based training held in a classroom environment. The second group will include members who use computer-based instruction. The instructor based training follows the typical classroom model: the instructor determines the content and method of delivery. The format for the computer-

based instruction will be an interactive CD ROM. The CBT will not deviate in instruction any time the activity is performed.

The identified target population is 119 total soldiers, 14 officers and 105 enlisted personnel, in E company 434th Main Support Battalion. This study will focus only on the enlisted soldiers. The researcher will attempt to sample 40 soldiers or 38% of the target population. 20 soldiers or 50% of the sample will participate in the computer-based training and the other 20 soldiers or 50% of the sample will participate in the instructor based training. The sample will not be stratified according to rank or time in service, but the soldier will be required to give that information in order to determine possible manipulation of data. Each sample group will receive training with like content; only the method of delivery will be different. The same assessment instrument will be administered to both groups.

When the training is complete, all of the soldiers will be assembled in one classroom and administered a paper and pencil test. The results will be collected on a Scantron answer sheet. The answer sheets will be individually graded using a previously prepared key. The instructor based training will be established as the effective learning norm and the results for the computer-based instruction will be evaluated against that norm.

Two different methods will be compared, CBT delivery and IBT delivery. A common paper and pencil test designed from the CTT manual will be administered to each group following the CBT. The CBT was developed with Macromedia Authorware© and is designed to be interactive with the soldiers, keeping them involved. The program is designed from the common tasks training manual (1-4), which is the standard training

competencies throughout the army. The IBT will be done covering the same material as that presented on the CBT on CD. The difference is the material on the CBT will be uniform and unchanging throughout the process. The material presented in the IBT will be influenced by the instructor's choices.

The researcher will collect data relating to training method, rank and time in service. This information is requested under the assumption that the experience of a soldier may skew the evaluation results because of prior knowledge. This is beyond the scope of the present study and will only be used to defend the validity of the results.

Design and Assumptions

The CD ROM is designed to encourage the soldier to interact on a constant basis with the computer. The soldier is better able to learn throughout the program with interaction every 30 seconds. The CBT does not allow the soldier to continue to the second set of objectives on the CD until the first series of practice questions has been answered correctly. Once the questions have been answered correctly the soldier is then able to move on through the CBT to the second set of objectives.

The objectives were obtained from the pass/ fail standard that has been previously set as a standard for the CTT manual. These objectives are also used throughout the CD as the questions that control advancement to the next section. This technique is found to be effective in the learning process for computer based programs. If there is no interaction with the computer, the soldier is able to flow through the computer program with out any forced learning or interaction involved. The reason for having the soldier answer questions during the program is that it forces him/ her to remain interactive with the material he/ she is learning.

Data Collection

Each group of soldiers was administered a paper/ pencil test following their training. The test was composed of 3 demographic questions and 15 content questions. Each person indicated his or her answers on the Scantron answer form. The nature of questions 14 thru 18 requires soldiers to indicate two choices for each question. This causes some difficulty because the answer forms could not be scanned for individual analysis. However, since the Army requires 100% correct to pass, this did not affect the study. The researcher will individually grade the answer sheet. The paper/ pencil test booklet and Scantron form are collected immediately after the soldier is finished with the exam. The Scantron form is collected in two separate boxes. One box contains answer sheets from the computer-based training and the other box contains answer sheets from the instructor-based training.

Test Results

Format of Test

The paper/ pencil test format used by the researcher was recreated from the CTT manual used throughout the army. The format given in the manual gives the soldier 15 objectives on a pass/ fail condition. If the soldier receives a fail in any of the 15 requirements, then he/ she does not pass the training. All the tasks must be successfully completed to the 100% standard in order to receive a passing score.

The test was designed in the same format as the IBT test usually normally given. The researcher presented the test in a book form. The CTT manual has the instructor setup a 1:50,000 military map, the instructor is to circle each item of the marginal

information found on the map. Randomly letter and circle each terrain feature A through J. Then circle the item or feature shown on the map in color. Randomly number each legend feature 1 through 10. These criteria are listed in the evaluation guide performance measures. Then the soldier takes a sheet of paper and two pencils, the soldier letters the paper A through J and 1 to 10. Then the soldier will write down the name of the item contained in each lettered and numbered circle on the map (Army, 1997).

The IBT would normally use a larger 1:50,000 military map. For purposes of convenience, the standard map will be scanned and portions of the map will be used to identify terrain features. The second part of the test booklet contains color maps because one of the required standards is to identify features by color.

Delivery

The researcher has the soldiers take the test from the instructor based training immediately after the class is given. Each soldier receives a Scantron form, testing booklet and a pencil. The test is given in the same room in which the class is administered.

The same testing booklet is given to the soldier taking the CBT. The soldier selected for the CBT receives a CD ROM, testing booklet and a pencil. He/ she takes the test at the computer station immediately after he/ she completes the CBT, just as the soldiers do with the IBT. The paper/ pencil test is the same for both sample groups.

Evaluation

The performance measure for the soldier to pass the training is 100%. Therefore, in the evaluation of the test the soldier must receive 100%. The Scantron forms are

compiled in two separate groups, the computer group and classroom group. The tests are then hand graded and data entered into a spreadsheet on Microsoft Excel. The spreadsheet will contain all the data from the testing booklet. The groups are separated on the spreadsheet for evaluation. The spreadsheet contains coded information for time in service and the rank of the soldier. This is collected to analyze whether the knowledge base the soldier may have had before receiving the training affects the test outcome.

The researcher will analyze the data looking at the 100% on the test forms. The standard for the soldier is 100%, so the evaluation must look at the number of Scantron forms from each group receiving a 100% score. The researcher will also analyze the data for the soldiers that do receive 100%, on their rank and time in service. This could skew the data, where the researcher could think the CBT or IBT may be more effective than it really may be.

Procedures

Instructor Led

The soldiers will be assembled in the designated classroom. Here the instructor will have the classroom set up with a map and tables with chairs ready for the IBT sample group. The soldiers receive the instructor based training in the same format that the class is normally given by the army. The researcher will remain in the room for unobtrusive observation of the IBT; when the instructor completes the training, the researcher will explain how to take the test. The researcher will administer the testing booklet, Scantron sheet and the pencils to all soldiers in the room. The soldiers will

receive as much time as possible, not to exceed one hour. At the completion of the test; the Scantron, booklet and pencils will be collected from the soldiers.

This research will be done during an Army National Guard drill weekend in November for the soldiers, therefore allowing convenience and participation. This does offer problems with personal conflicts in schedule, which may result in absenteeism from the research. Still a simple random sample will be done with the use of a table of random numbers. The last two digits of the soldier's social security number will be used on the table. It is not applied and used until the drill weekend because the researcher does not have a record of which soldiers will be attending the drill weekend for November. The table will allow for a variety of soldiers, with different skills and knowledge of the material, to be placed randomly in either group.

Computer Based

The researcher will administer the CBT in the orderly room of the National Guard Armory. This room has been designated for the use of the CBT, and 5 laptop computers will be set up on the conference table. The stations are set up having the laptop computer, the CD ROM, a test booklet and a pencil. This arrangement will allow for 5 soldiers to take the CBT at a time, one group of 5 is allocated one hour to complete the instructions and test. The CBT group will receive a short period of training about the technology.

The instructions explain what they are about to do, how much time they will be allowed and where to place the test booklet when they have completed the CBT. The researcher will stay in the room during the entire hour of each application of the test, for unobtrusive observation. The researcher is in the room only to help with technical

difficulties that may arise while administering the test. When the soldiers are done with the CBT, they will immediately take the paper/ pencil test.

Paper Pencil Evaluation

The cover of the test booklet contains the name of the course and the purpose of the study. The human subject in research form is the very first page in the booklet. This is included to assure voluntary participation and to inform the soldier of the nature and purpose of the research. The test begins with the statement of the task, condition and standard. This is format for the army. The first three questions in the test booklet are personal data and do not influence a pass/ fail score for the soldier. The information is obtained only for the researcher to use in comparative analysis of the data.

The test begins immediately prior to question 4, with instructions on how the testing booklet is set up. The researcher does not create the questions used throughout the test booklet, or the map attached to each section of the test. Normally, a large map in 1:50,000 scale would be placed on the table. The terrain features would be circled and identified with numbers and letters. However, to allow for effective administration of the CBT, the researcher designed the test booklet to contain smaller sections of a map with the features circled and labeled with the letters A thru J. This testing booklet will be created so the researcher will have control of the results for analysis and comparison.

Data Analysis

Results

The results are based on the 100% accuracy required by the army. This criteria is set by the CTT manual from the military and the researcher can not set the passing

criteria for the training. Therefore, in order to analyze the effectiveness of the CBT compared to the IBT, the researcher must determine the number of soldiers that obtain a passing score of 100% accuracy in each group. The researcher will also look at the data to see if there are any common errors within the answers, which may contribute to the validity of the instruments used in the study. The researcher will also analyze the personal data of the soldiers with the 100% because of the possible skew of the results from prior knowledge of the soldier.

Results on Delimitations

The personal data allows for the researcher to take into account other factors, which could affect the results. The researcher must first separate the two groups being analyzed in the study. They will be separated by type of instruction received, CBT or IBT. The Scantron forms are separated into two piles and will be compared against each other.

First the researcher will compare the number of soldiers from each group who receive a passing score. Then the researcher will compare the rank of the soldiers who passed. This will indicate if soldiers with senior rank and time in service perform better. This may also indicate prior knowledge and influence the results.

The researcher anticipated the rank and/ or time in service would influence the results. The military structure requires soldiers to constantly participate in training, therefore it is reasonable to presume soldiers with senior rank and more years of service will have a higher level of prior knowledge. This may possibly also skew the data in the results because of prior knowledge of the soldiers.

The researcher will also look at repetition of wrong answers to questions, in general and within the two groups. This will allow for an analysis of the instrument and encourage the researcher to look at the validity of the instruments used to measure the effectiveness.

CHAPTER 4

FINDINGS

Methods Used

Delivery

The delivery of the CBT did not go quite as planned. I was able to administer the training and testing a day earlier. Just as planned, the orderly room was used as the designated area for the laptop computers to be set up for the CBT. The large conference table was used for the computers, allowing for a lot of space for the soldiers to take the paper/ pencil test at their stations. The research began at 9:30 am because of technical difficulty with the laptop computers. The soldiers came in shifts each hour, as coordinated with the platoon sergeants. Two groups of 5 were completed before lunch and two shifts were completed after lunch. The administration of the CBT was completed by 2:30 pm.

The IBT was scheduled to be administered in a classroom at the National Guard Armory in Cottage Grove. Since the study was administered a day earlier than planned, there was already a medical class held in the classroom that afternoon. The classroom training was then changed and scheduled for 1:30 at Crestview Middle School. This was chosen as the alternative for the training because it was located near the National Guard Armory. The instructor was the one designated one month prior to the study, since she does most of the CTT training for the unit. The researcher did attend the IBT to ensure that all areas of the course were covered and to administer the paper/ pencil test to the soldiers. The IBT was given in the cafeteria of the school. This room was chosen the day of training because of the number of people it can hold and the accessibility to large

tables. The IBT began at 1:30 pm and was completed at 2:00pm and materials were gathered and brought back to the armory.

The test booklet designed by the researcher had gone through eight revisions before use in the study. The areas of interest for the design were to keep up with the performance measures stated within the CTT manual, yet make it more user friendly, and design a data collection process. The first half of the booklet does not feature colored maps because the objective is to identify marginal information based on location in the map sheet. The rationale for color in the second part of the testing booklet is the soldier must identify terrain features based on shape, logic, size and **color**. Therefore, the map they work from must be in color.

Minor changes needed in the design of the testing booklet were done after the pilot. The test booklet was modified after the pilot. The most important changes were made prior to the pilot, identifying the purpose and ease of A though J answers used. This allowed delimitation of bias in the correction of the answer sheet. Yet, in order to create a valid testing booklet, the researcher had to design the answers so the correct response to the question was not obvious. As a result, each set of two questions had a separate map to go along with it and this created a much larger testing booklet.

Observations

I observed that the students in the pilot found the materials user friendly. Students received the test booklet, pencil and CBT at their computer stations. No one asked any questions about the navigating of the instrument; they were only given the instructions on the field study, and told that when they were completed with the CBT they would

continue on with the testing booklet. There were changes pointed out by the students on what could make the CD Rom better and even more user friendly. The students completed the entire CBT within 15 minutes. The students had little difficulty with navigation and understanding of the CBT.

The pilot was a distorted version of the actual population, since most students do use computers on a daily basis. Consequently, the unobtrusive observation by the researcher saw many areas of computer skills. There was a wide range of computer knowledge that was not taken into consideration prior to administering the study. These people were health care professionals and may not use a computer as frequently as the typical college student. An hour of time was allotted for the CBT per sample group. Some of the soldiers took the entire hour and others were finished within 20 minutes. Many questions were asked about navigation on the CBT that had not been asked during the pilot test. Yet, with the wide variety of computer skills, soldiers were absorbed in the activities and many cheers were heard when the soldiers completed the questions in the CBT with a correct response.

The instructor led training was administered just as all CTT training is done. The room was quiet and the soldiers sat as the instructor conducted the training. The researcher also observed many soldiers staring off into space, and looks of disinterest in the class. Soldiers did not ask a single question, nor were questions asked of the soldiers to keep them focused on the training.

Grading Methods

The standard for the training is 100% accuracy as previously identified by the military. The researcher tabulated the tests based on a pass/ fail if the soldier was 100% correct. The test was setup to use a Scantron form, but the use of multiple answers for questions 14-18 were not usable at the testing center. As a result, the Scantron form was not needed and the soldiers could have marked their answers directly on the testing form.

A Scantron form was originally chosen for ease in the collection of data. This would tell the researcher the passing test scores and the personal data of each answer sheet. The researcher hand graded the Scantron forms and then entered the information into Microsoft Excel and Microsoft Access.

Data Selection

Demographic Data

The demographic data used to interpret the outcome of the research was limited to two categories, time in the military, and rank. The demographic data was entered into the beginning of the test manual in the "personal data" box. The rationale for using the two demographics categories was to give the researcher an opportunity to interpret whether prior knowledge would influence the results. The research effectiveness was not to focus on incremental effectiveness and could possibly be used in further studies.

The rank of the soldier tells the researcher approximately how long the soldier may have been in the military and what type of military schools he/ she has attended. This would impact the results, since land navigation is a huge part of training in all advanced NCO schools. Therefore, a soldier with the rank of E6/ SSG will have been

through many of these schools and received a considerable amount of training on this subject.

The computer sample group had a wide variety of soldiers in rank and time in service (see appendix). The categories of soldiers who passed with 100% accuracy ranged from E1 to E6, with less than 2 years in service, to soldiers with more than 12 years in service. Three of the five soldiers were E1 to E4 with less than 4 years in service. The other two were E5 with less than 4 years in service and E6 with more than 12 years. There were 4 soldiers from the IBT group who scored the 100% standard. These 4 soldiers were all at the rank of E4 and ranged between 4-8 years in service.

The time in service would indicate the number of opportunities the soldier has had for this training, but is not a definitive measure of accounting for training at hand. Rank is not always directly related to time in service, there are many instances where a soldier may only hold the rank of E3/ PFC or E4/ SPC, but has a lot of time in service. Therefore, because the training is yearly and conducted throughout the training year with the Army National Guard, the soldier has potentially been trained numerous times on this material. Either of these conditions could affect the data the researcher is trying to obtain.

Item Analysis

The individual items in the testing manual are not the significant information the researcher is trying to obtain. The initial information the researcher will be gathering is the number of tests scores answered with 100% accuracy. This is because the army standard is 100% accuracy to pass. The researcher will observe individual items within the answer sheets of any pattern of incorrect responses that occur. If this does prove to be

evident in the grading process, an item analysis can be done in future research to ensure the validity of the instrument.

First graded answer sheets were reviewed to identify pass/ fail scores on each group. The researcher found that 5 soldiers from CBT group passed with 100% standard and 4 from the IBT group passed at the 100% standard. These results indicate that the CBT had a higher percent of soldiers passing, but both groups were very close. One obvious pattern did emerge, one question, question #17 in the test booklet was repeatedly answered incorrectly. Further analysis of this pattern determined that when the question was answered incorrectly, the wrong choice was "C". The researcher then decided to eliminate question #17 from both of the sample populations (see appendix). This change did not affect the instructor based training, but did however, impact the results of the CBT group. If question #17 were eliminated, then the results for the CBT group would change from 5 to 11 passing at the 100% standard.

Weakness to Study

The sample size as compared to the entire military is much too small, yet statistically using 40 of 105 soldiers in the company gave me a sample size of over 38% of the population. The computer-based knowledge of the soldiers prior to the CBT was a weakness, thus accounting for time and frustration in the learning process.

Relationship to Theory

Corresponding Literature

The students were engaged in the learning process during the CBT. Many of the soldiers were observed by the researcher as disengaged during the IBT. The start up cost of the CBT is initially high due to many varying costs in media, but would become cost effective over time.

Research Observations

The unobtrusive observations made during the study were surprising. The researcher noticed an active involvement with the CBT and shouts of joy when the answers were correct in using the CBT. The frustration came with some of the soldiers who were unfamiliar with the equipment. Overall, the soldiers seemed to enjoy and move easily through the course with active engagement in the training.

The observation of the instructor led training was that all the same information was covered by the instructor, yet his/ her voice was very monotone and unexcitable to the learners. I noticed many looking at the floor, staring into space and very unengaged in the instructor's information. The soldiers knew they would be tested on the information when the training was complete, yet there was no active participation from any of them within the sample group.

Conflicting Literature

The soldier's statistical outcome of the CBT was higher and significantly higher with the elimination of question #17. This was something the researcher did not expect to

see, since there was no supporting information found prior to this study. The research done prior to the study concluded the CBT and IBT both had their benefits, yet no model was better to use than IBT because of the social interaction. The CBT main contribution was the cost effectiveness.

There were no main differences in the delivery of the training. Both of the groups received training in a room with little noise or distractions, all of the same material was covered and the sample groups were equal. The difference was the form in which the material was delivered.

Relationship to Practice

Pilot Test

The pilot for the instruments of the CBT and the paper/ pencil test was administered on November 12, 2001 at 4:30 pm in the Home Economics computer lab room 436. The sample group used in the study was composed of students from the University of Wisconsin Stout, ages ranging from 19 to 25. Nine students were chosen as the sample group because of their age. This group had no prior knowledge of map reading. The purpose of this pilot was to determine the accuracy and completeness of the CBT materials. The pilot group is equivalent to 20.2% of the intended sample population.

Paper/ pencil Test

Only minor changes were necessary. The changes included correcting a grammatical error in question 5, taking out the word “is”. Another correction was adding instructions at the beginning of question 14. Students were unclear that they were to

answer the question using two answers on the Scantron sheet, so most of them had only marked one answer.

CD ROM

The CBT also required minor changes in format. Change one consisted in changing the name of the icon from “Army CBT” to “Click Me”. This was to ensure user friendliness when beginning the CBT, so there would be no mistake in what to click on to begin the program. Change two was in the storyboard of Authorware. The change made was to have a second quiz within the CBT come after the second set of objectives. Change three was to add instructions throughout the CBT on how to use each screen; this was to allow for persons with minimal computer competencies to proceed through the program with less difficulty. Change four consisted of grammatical errors that had to be corrected throughout the CBT.

Unobtrusive Observation

The CBT material is constant and the material does not change. This allows for the material to be presented the same and unchanging each time the course is given. It also covers all the material, not having things forgotten or left out by an instructor. Next, the learner is in control of the computer based training, which relates to the anytime and anyplace concept. If the soldier is absent from training there will be no need for an instructor to give the class, all the soldier needs is a computer and CD ROM. He/ she is able to complete the training at his/ her own rate and time. Finally, there is immediate feedback during the training with the CBT. The design of the CD forces the soldier to

have constant interaction, which facilitates the learning process. Also, the design does not let the soldier progress through the training without answering the questions correctly. If the answers are incorrect the CBT brings the soldier to remediation in the training.

The CBT design forced a constant interaction with the soldier, which allows for learning to occur. Inserting a quiz throughout the CBT forced the soldier to pay attention to the material and have remediation on the material in which he/ she is unclear. The one area of concern in the research was the computer skills and ability of the users. Many instructions are given throughout the CBT, but others may need to be inserted to allow for clarity in the navigation on the screen. Also, the time allotted for use can be extremely different. This could force the soldier with very little computer skills to become irritable and frustrated with the CBT, possibly causing disinterest.

The IBT allows for questions to be asked and answered immediately by the instructor, giving a personal touch to the class that a CD cannot. This was not observed in the IBT from the soldiers, since no questions or comments were made on their part.

Comments from Users

The CBT instrument was successful in providing some personal touch to the program by inserting feedback such as “Great job!” when the soldiers answered questions correctly. The respondents were pleased when they read the comments aloud as they moved on through the next section of the CBT quiz.

Summary Statement

Based on the raw results, CBT and IBT were very similar in learning effectiveness. However, if question #17 were to be eliminated it would have a huge impact on the results. This would indicate that the CBT was more effective than IBT for identifying Terrain Features. The researcher's observations of students in the training environment indicated that student interaction with the material to be learned was an important factor. Other elements of the training were consistent between the environments. Student attitudes when engaged with the material were different. This indicates that the proper design of the CBT is important in promoting learning effectiveness.

CHAPTER 5

CONCLUSION OF RESEARCH PROJECT

Summary

E company, 434th Main Support Battalion currently has a high rate of absenteeism on drill weekends. The make up training provided during the week does not match the training missed on the weekend drill. Therefore, a possible solution proposed to make up the training is Computer Based Training. For the purpose of the study, a CD ROM has been created as the instrument for training when an instructor is not present for training.

The CBT design has been created to allow for constant interaction by feedback to the soldier during the training to facilitate the learning process. The instrument was designed with Macromedia Authorware© and Macromedia Flash. To personalize the instrument, the use of many forms of multimedia are present throughout the CBT (see appendix G).

The IBT format for training is standard throughout the training done in the Army. Therefore, extra demands were made to the instructor based training administered to the soldiers. I did observe the training to ensure that the instructor left out no information. This was only to make sure all the proper information was covered from the CTT manual (see appendix F).

The paper/ pencil test I designed for the study was comprised of the objectives and questions from the CTT manual. The booklet was designed from the performance measures stated in the CTT manual. Some changes were made to enable to soldiers to answer on a Scantron form. It was also designed to compare the effectiveness of the CBT to the IBT in a military environment. I took the performance measures from the manual;

designed the format to conform to the traditional setting of the test, and bound the test in a booklet format. Care was taken to duplicate the existing format as closely as possible to ensure validity in the study (see appendix C).

The final result of the CBT compared to the IBT was that the CD ROM was more effective in the learning process than that of the IBT. The test measures 100% accuracy with both test groups. The results of the CBT were 5 soldiers out of 20 received 100% correct, compared to the IBT, where 4 soldiers received 100% correct. The only major discrepancy I noticed in the analysis of the data was question #17 from the CBT sample group. There was a significant pattern of incorrect answers. Many of the soldier marked "C". Therefore, I have concluded I should analyze the question to determine what would lead soldiers to select the incorrect answer. If I were to eliminate question 17 from both of the scores, the IBT group remains at 4 out of 20 soldiers with 100% correct, but the CBT group changes from 5 correct to 11 out of 20 correct responses. This is a drastic change in the data. This information is not looked at in great detail, but will possibly be analyzed further in another study.

CBT Results

Pass/ Fail	*Year in Service*	*Rank*
F	E	B
F	E	C
F	D	C
F	D	B
F	C	B
F	E	B
F	A	A
F	D	A
F	B	A
F	B	A
F	C	A
F	E	B
F	B	A
F	B	A
F	B	A
P	E	C
P	C	B
P	B	A
P	B	A
P	A	A

Personal Data:

1. Years in Service:
(A) 0-2 yrs (B) 2-4 yrs (C) 4-8 yrs (D) 8-12 yrs (E) 12+ yrs

2. Group:
(A) Computer(B) Classroom

3. Rank:
(A) E1-E4 (B) E5 (C) E6 (D) E7 (E) E8=

CBT Drop

Drop Q17	*Year in Service*	*Rank*
F	E	B
F	E	C
F	E	B
F	A	A
F	B	A
F	B	A
F	B	A
F	B	A
F	B	A
P	E	B
P	C	A
P	C	B
P	B	A
P	E	C
P	D	A
P	B	A
P	C	B
P	D	B
P	D	C
P	A	A

Personal Data:

1. Years in Service:
(A) 0-2 yrs (B) 2-4 yrs (C) 4-8 yrs (D) 8-12 yrs (E) 12+ yrs

2. Group:
(A) Computer(B) Classroom

3. Rank:
(A) E1-E4 (B) E5 (C) E6 (D) E7 (E) E8+

IBT Results

Pass/ Fail	*Years in Service*	*Rank*
F	B	A
F	C	A
F	C	A
F	C	A
F	C	A
F	B	A
F	A	A
F	A	A
F	C	A
F	A	A
F	B	A
F	C	A
F	A	A
F	B	A
F	C	A
F	C	A
P	C	A
P	C	A
P	C	A
P	C	A

Personal Data:

1. Years in Service:

(A) 0-2 yrs (B) 2-4 yrs (C) 4-8 yrs (D) 8-12 yrs (E) 12+ yrs

2. Group:

(A) Computer(B) Classroom

3. Rank:

(A) E1-E4 (B) E5 (C) E6 (D) E7 (E) E8+

IBT Drop

Drop Q17	*Years in Service*	*Rank*
F	B	A
F	C	A
F	C	A
F	C	A
F	C	A
F	B	A
F	A	A
F	A	A
F	C	A
F	A	A
F	B	A
F	C	A
F	A	A
F	B	A
F	C	A
F	C	A
P	C	A
P	C	A
P	C	A
P	C	A

Personal Data:

1. Years in Service:
(A) 0-2 yrs (B) 2-4 yrs (C) 4-8 yrs (D) 8-12 yrs (E) 12+ yrs

2. Group:
(A) Computer(B) Classroom

3. Rank:
(A) E1-E4 (B) E5 (C) E6 (D) E7 (E) E8+

CBT Dual

Drop Q17	*Pass/ Fail*	*Rank*	*Year in Service*
F	F	A	B
F	F	A	B
F	F	A	B
F	F	A	B
F	F	A	A
F	F	A	B
F	F	B	E
F	F	B	E
F	F	C	E
P	F	A	C
P	F	A	D
P	F	B	E
P	F	B	C
P	F	B	D
P	F	C	D
P	P	A	B
P	P	A	B
P	P	A	A
P	P	B	C
P	P	C	E

Personal Data:

1. Years in Service:
(A) 0-2 yrs (B) 2-4 yrs (C) 4-8 yrs (D) 8-12 yrs (E) 12+ yrs

2. Group:
(A) Computer(B) Classroom

3. Rank:
(A) E1-E4 (B) E5 (C) E6 (D) E7 (E) E8+

Purpose of the Study

The purpose of the study was to offer a possible alternative for training to the Minnesota Army National Guard when an instructor is not available or the soldier is absent from training. The proposed training alternative is a CBT. The CBT is designed to enable a soldier to master the content by interacting with the material, a method that provides for reinforcement and stimulates learning.

Methods and Procedures

The CBT was created with objectives and format of the CTT manual. The CBT had to cover all areas of the CTT manual and retain the same format in which the class would otherwise be administered in the classroom setting. I chose the Macromedia Authorware© and Macromedia Flash programs because they allowed me to create a rich, interactive, multimedia tool. This was important so that the CBT CD-ROM would provide the user with a friendly interface and encourage interaction with the material to be learned.

I began by analyzing the IBT materials from the CTT manual to determine the content that must be included and the resources to support the learning. I then had to analyze what took place in a traditional IBT setting and determined how to duplicate that in the CBT environment. Finally, I carefully studied the expected standards to determine how to present the material.

Next, I created a storyboard (see appendix D & E) to help me utilize the process and to act as a guide for the technicians who would create this instrument for me to use in the research. A technical team was assembled to discuss the design and conceptualize the

instrument. The team was able to assess what can happen with the use of Authorware, and the best possible results of the CBT with the design that I had chosen for the training. The team met for one hour a day for three weeks to discuss what I liked and did not like with the CBT.

The CBT was piloted with the use of volunteer students at the University. I chose to use students since there would be no prior knowledge of the class. I felt this would allow for the best input on the comprehension and user friendliness of the CBT. However, this was not completely the case. In focusing on the prior knowledge of the content of the CBT when choosing the sample population for the pilot, I forgot about one important part of the population that I did choose. These were college students who have access to and use a computer on an almost constant basis. Even though there was no knowledge on how the course did work, they went through the course with ease, pointing out minor, but important changes that needed to be made. The prior knowledge and computer skills were a factor that was not taken into consideration until the day of the study.

The CBT was administered on the 17th of November to the Medical Company in the MSB. These health care professionals do not all use computers on a constant level and some had almost no computer skills or knowledge. This became apparent when the soldiers were taking up to an hour to complete the same CBT that was completed in 15 minutes by the pilot group. In my observation this also became very frustrating to the soldiers who did not use computers often.

Conclusion

The results of the study show the CBT to be more effective than the IBT. I feel there is little room for bias or skewing of the data when performance measures and criteria have been implemented prior to the study and the same measures were used in both training systems. With the unobtrusive observation with the classroom and the computer group, I feel the results of the CBT were more effective because the soldier was more engaged in the training. He/ she was able to see immediate results and feedback when he/ she was being trained and if the answers were incorrect, he/ she was able to go back to remediation within the CBT.

Based on the results of the study, I feel this would be an effective alternative to CTT in the Minnesota Army National Guard. The CBT allows for ease of making up the training at anytime and anyplace for the soldier.

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Cost of CBT	Description of Cost	Cost of item
Personnel		
4 Technical personnel	[($13.00 hr X 20 hrs week) X 4 Personnel] X 3 weeks	$3,540.00
CD's		
Computer Disks to Format	50 CD's per pack	$67.00
Authorware		
Commercial Use	Commercial use of Authorware, may be used for more than one use.	$895.00
Maps		
Military Maps to Scan	Military Map $3.00 X 2 maps	$6.00
Burning of CD		
Commercial Cost	50 CD's per pack X $5.00 per CD Burned	$250.00
Cost of CBT		$4,758.00
Cost of IBT		
Drill weekend Instructors		
E5 with 6 years in service	2 soldiers X $350.00 per weekend for Instructors	$700.00
Small Items		
Maps	10 maps X $3.00 per military map	$30.00
Paper	1 box (350 sheets) paper X $4.00	$4.00
Pencils	24 pencils (2 boxes X $2.50)	$5.00
Protractor	10 protractors X $.75	$7.50
CTT Manual	10 Common Task Training Manuals X $5.00	$50.00
Cost of IBT		$796.50
Cost Comparison	IBT cost comparison to CBT	16.74%

TABLE 2.
Economics of CBT in comparison to off-site training.

	OFF-SITE COURSE	CBT COURSE	OTHER COURSE
Length of Course (Hours for Given Amount of Course Material)	40	32	
COST:			
Cost of course	$1000	$600	
Cost of travel	$1000	--	
Cost of trainee's time (excl. travel)	$1200	$960	
Cost of trainee's time (travel only)	$240	--	
Total direct cost for training:	$3,440	$1,560	$--
VALUE:			
Comprehension, percent	50 %	80 %	
Retention, percent	40 %	60 %	
Effectiveness ratio (comprehension x retention)	20 %	48 %	0 %
Net effective cost (direct cost/effectiveness ratio)	$17,200	$3250	$--
Net effective hourly cost (net effective cost/hours of course length)	$430	$102	$--
Assumptions:			
40-hr course. Assume remote off-site training requiring a week's travel.			
Assumed $/hour for trainee's time.	30		
Assumed number of travel hours to and from course	8	0	

APPENDIX C

8 November 2001

NAVIGATE
Identify Topographic Symbols on a Military Map
071-329-1000

CONDITION
Given a standard 1:50,000 Scale Military Map

STANDARD
Identify topographic symbols, colors, and marginal information on a military map with 100 percent accuracy

The following questions correspond with the maps attached. The letter used below the question is the answer that is given on the map. Darken the answer that best answers the question. If you have problems at any time during the evaluation, please ask the instructor to clarify the question. You must receive 100% on the following to receive a GO. If any performance measure is failed, the soldier will receive a No-Go on this evaluation.
All answers given below will be held in the highest confidentiality and only used for the purpose in which this study is intended, to compare instructor based training to computer based training in a military environment.

Personal Data:

1. Years in Service:
(A) 0-2 yrs (B) 2-4 yrs (C) 4-8 yrs (D) 8-12 yrs (E) 12+ yrs

2. Group:
(A) Computer (B) Classroom

3. Rank:
(A) E1-E4 (B) E5 (C) E6 (D) E7 (E) E8+

This first part of the test you will use the map allocated for each section, then mark your answers correctly on the answer scantron sheet provided.

(Use Map I for the next section)

4. Identify the Map Sheet name.

4.1 (A)
4.2 (B)
4.3 (C)
4.4 (D)
4.5 (E)

5. Identify is the Map Sheet Number.

5.1 (A)
5.2 (B)
5.3 (C)
5.4 (D)
5.5 (E)

(Use Map II for the next section)

6. Identify the contour interval.

6.1 (A)
6.2 (B)
6.3 (C)
6.4 (D)
6.5 (E)

7. Identify the GM angle.

7.1 (A)
7.2 (B)
7.3 (C)
7.4 (D)
7.5 (E)

(Use Map III for the next section)

8. Identify the legend on the map.

8.1 (A)
8.2 (B)
8.3 (C)
8.4 (D)
8.5 (E)

9. Identify the bar scale.

9.1 (A)
9.2 (B)
9.3 (C)
9.4 (D)
9.5 (E)

(Use Map IV for the next section)

10. Identify the declination diagram.

10.1 (A)
10.2 (B)
10.3 (C)
10.4 (D)
10.5 (E)

11. Identify the grid reference box on the map.

11.1 (A)
11.2 (B)
11.3 (C)
11.4 (D)
11.5 (E)

(Use Map V for the next section)

12. Identify the adjoining map sheet diagram.

12.1 (A)
12.2 (B)
12.3 (C)
12.4 (D)
12.5 (E)

13. Identify the elevation guide.

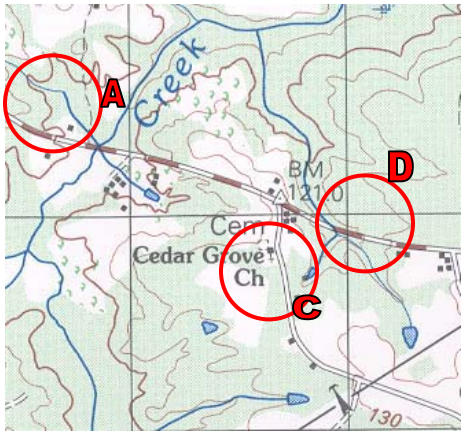
13.1 (A)
13.2 (B)
13.3 (C)
13.4 (D)
13.5 (E)

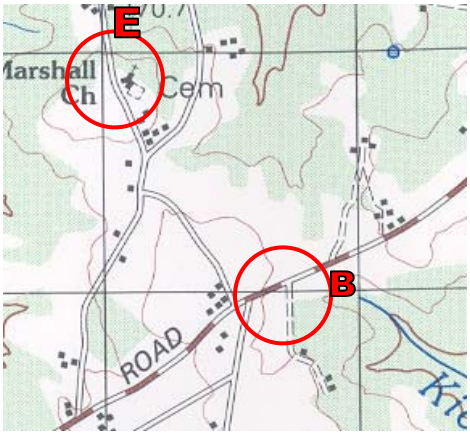
The following questions 14- 18 should be marked with two answers for each question on the scantron sheet provided.

(Use Map below)

14. Identify 2 of 2 specific man- made features shown on the map.

14.1 (A)
14.2 (B)
14.3 (C)
14.4 (D)
14.5 (E)

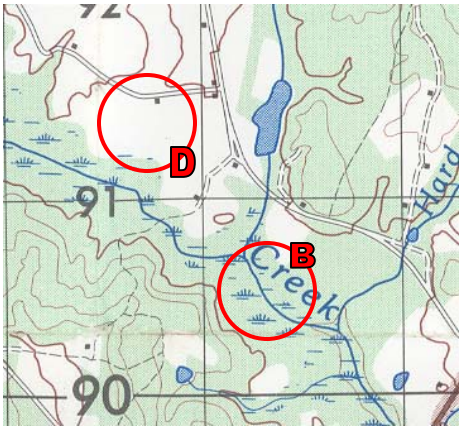


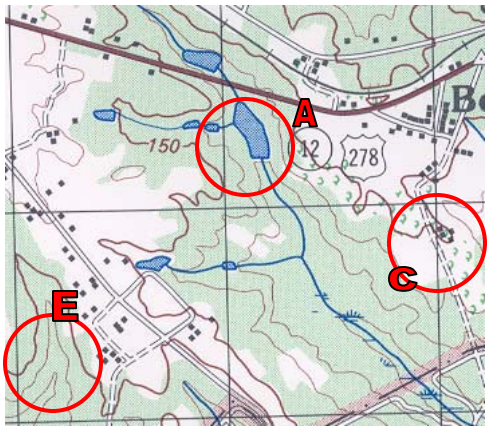


(Use Map below)

15. **Identify 2 of 2 water features shown on the map**.

15.1 (A)
15.2 (B)
15.3 (C)
15.4 (D)
15.5 (E)

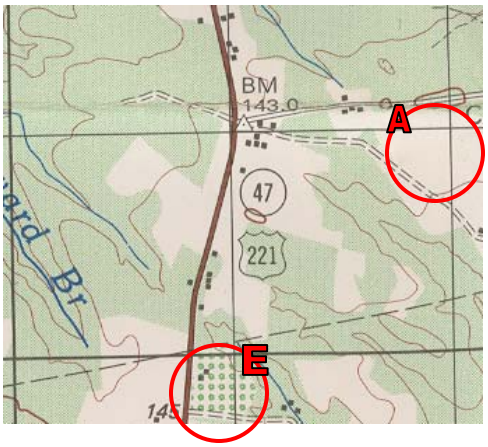


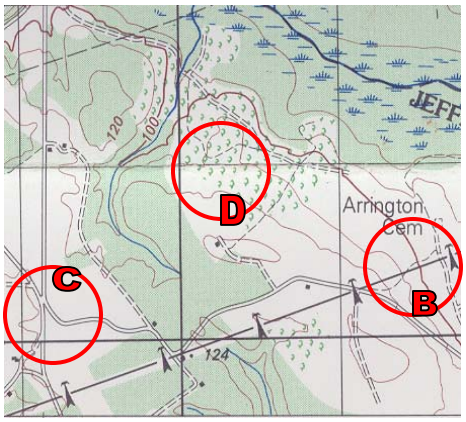


(Use Map below)

16. Identify 2 of 2 vegetation features shown on the map.

16.1 (A)
16.2 (B)
16.3 (C)
16.4 (D)
16.5 (E)

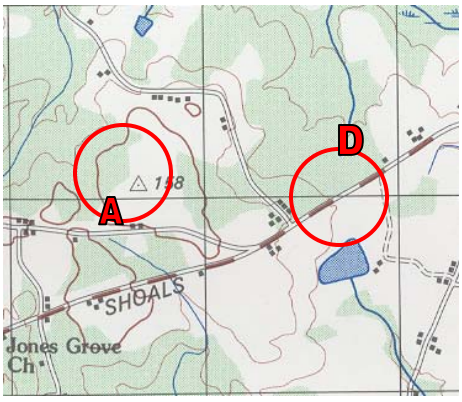


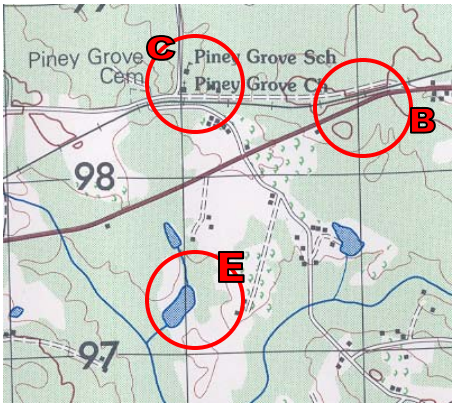


(Use Map below)

17. Identify 2 of 2 man made features shown on the map.

17.1 (A)
17.2 (B)
17.3 (C)
17.4 (D)
17.5 (E)

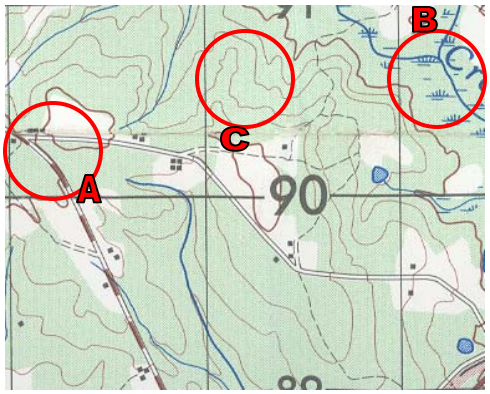


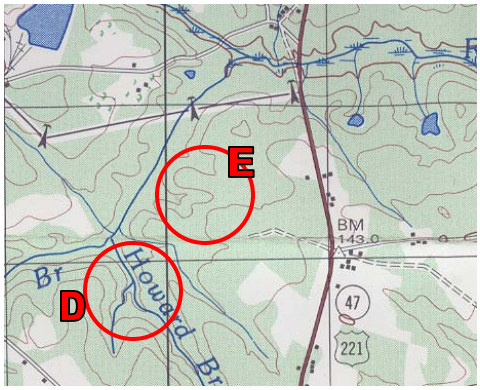


(Use Map below)

18. Identify 2 of 2 contour lines shown on the map.

18.1 (A)
18.2 (B)
18.3 (C)
18.4 (D)
18.5 (E)

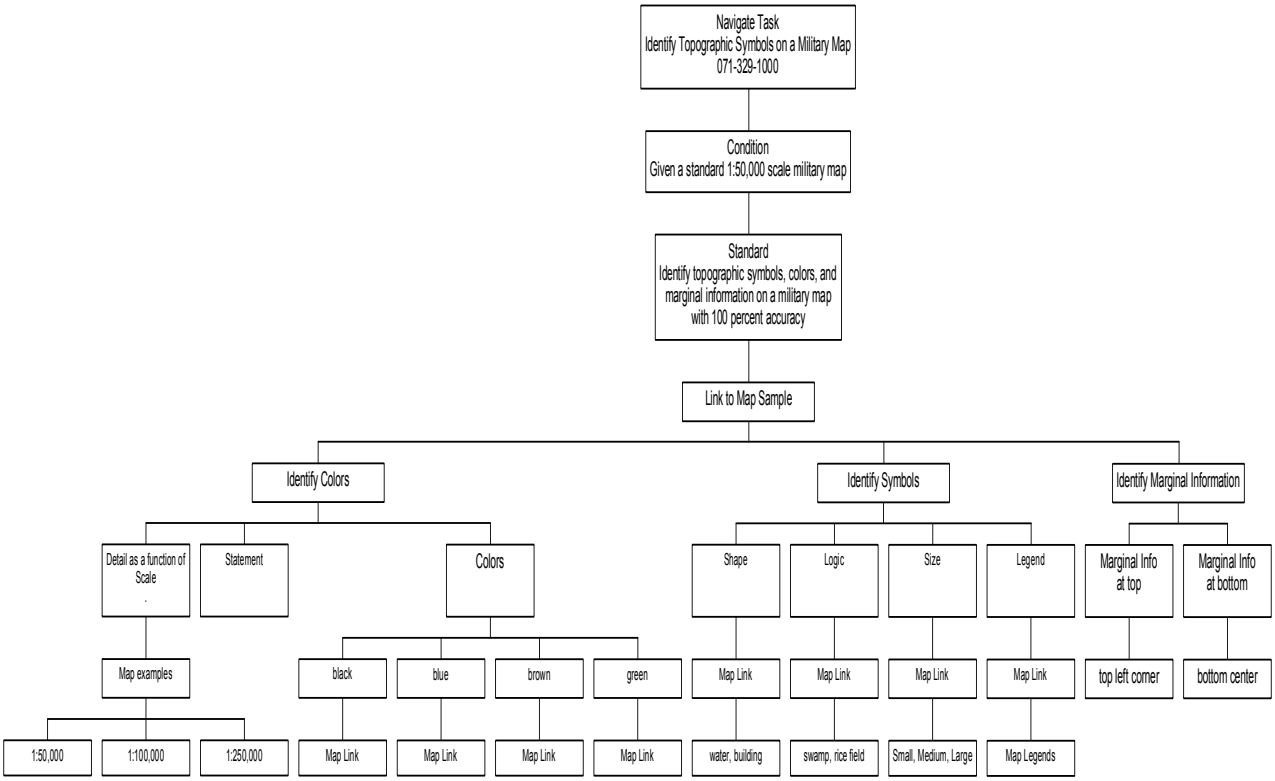


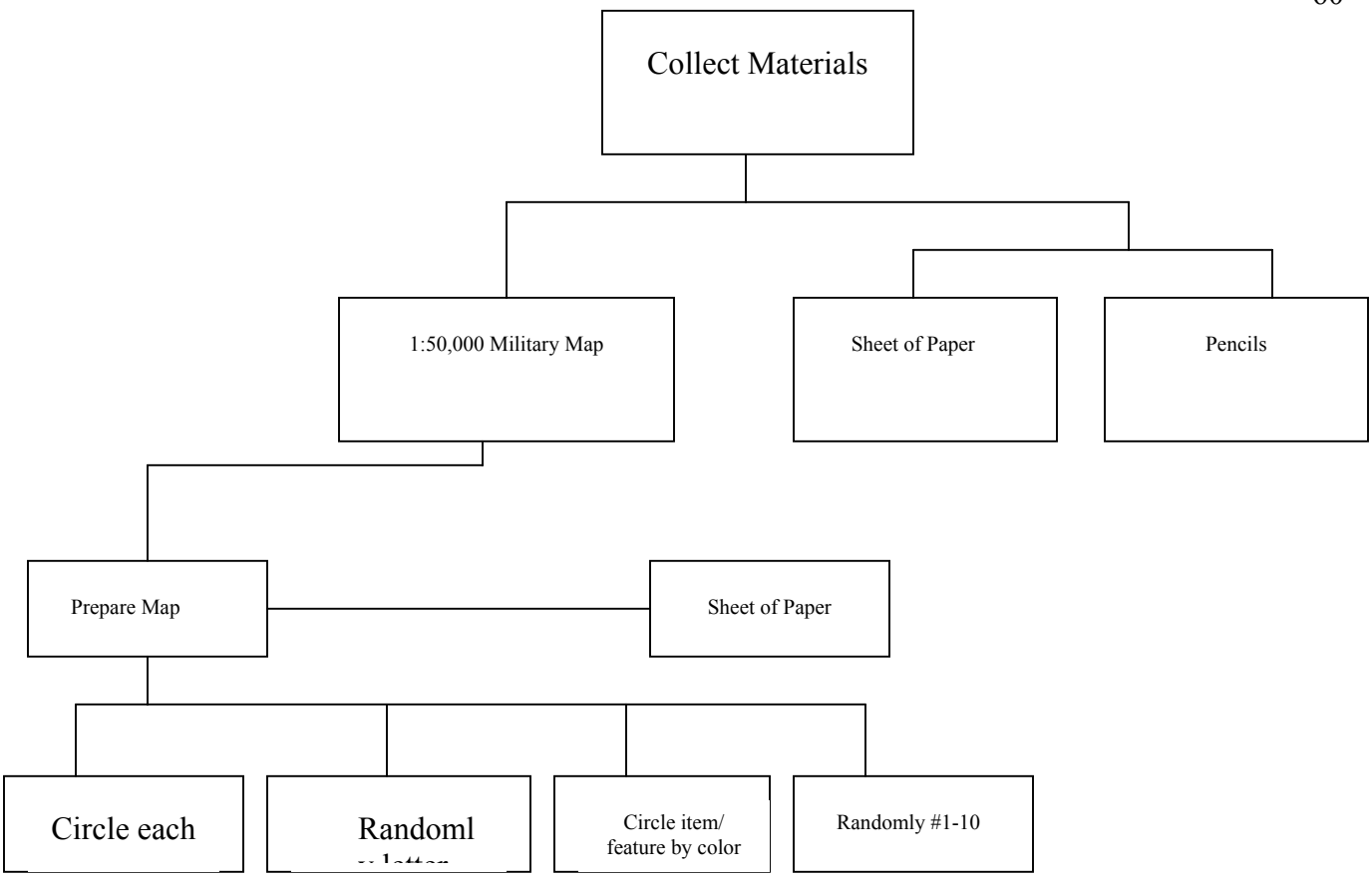


Thank you for your time and effort in this study!
Lieutenant Rebecca Soplata
MS Officer

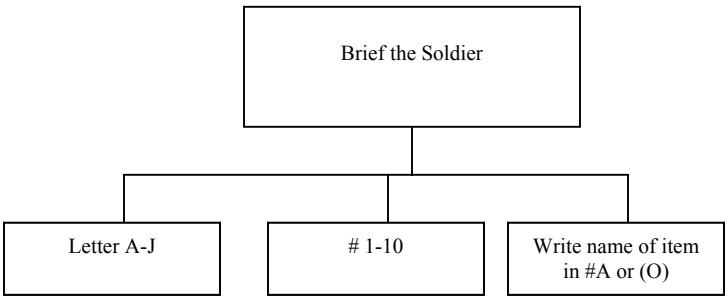
Story Board

Computer Based Training compared to Instructor Based Training in a Military Environment





Story Board
Evaluation & Preparation



APPENDIX F

The Military Map

CONDITIONS

Given a standard 1:50,000-scale military map.

STANDARDS

Identify topographic symbols, colors, and marginal information on a military map with 100 percent accuracy.

TRAINING AND EVALUATION

1. Identify the colors on a military map.

    a. The ideal situation would be that every feature on that portion of the earth being mapped could be shown on the map in its true shape and size. Unfortunately, that is impossible.

    b. The amount of detail shown on a map increases or decreases, depending on its scale; for example, a map with a scale of 1:250,000.

    c. Details are shown by topographic symbols. These symbols are shown using five basic colors as indicated below:

    - Black - Man-made features other than major roads
    - Blue - Water
    - Brown/Red-Brown - All relief features and contour lines
    - Green - Vegetation
    - Red - Major roads

    2. Identify the symbols used on a military map to represent physical features, such as physical surroundings or objects, as shown below:

    - Drainage features are shown in the color blue. These symbols include lakes, rivers, marshes, swamps, and coastal waters.
    - Relief features are shown in the color brown. These features are normally shown by contour lines and intermediate contour lines. In addition to contour lines there are relief symbols to show cuts, levees, and strip mines.
    - Vegetation features are shown in the color green. These symbols include woods, scrubs, orchards, vineyards, tropical grass, tundra, mangrove and marshy areas.
    - Roads are shown in the color red or black. These symbols show hard

surface heavy duty roads, hard surface medium duty roads, improved light duty roads, unimproved dirt roads, and trails.

- Railroads are depicted in the color black. These features show single track railroads in operation, singl;e track railroads not in operation, and double or multiple track railroads.
- Buildings, ruins, churces, schools, and cemeteries are shown in the color black. Major built-up areas may be also be shaded in the color red.
- NOTE: Always refer to the legend to see what other special colors are being used on that particular mapsheet. For example, our Camp Atterbury map sheet also uses red to delimit an impact area, blue to show a no tactical training area, and green to show block training areas

a. The shape of an object on the map will usually tell what it is used for example, a black, solid square is a building or a house; a round or irregular blue item is a lake or pond.

b. Logic and what the colors mean must work together in determining a map feature. For example, blue represents water. If you see a symbol that is blue and has clumps of grass, this would be a swamp.

c. The size of the symbol shows the approximate size of an object. Most symbols are enlarged 6 to 10 times so that you can see them under dim light.

d. Use the legend; it has most of the symbols used on the map.

3. Identify the marginal information found on the legend.

a. Marginal information at the top of the map sheet.

(1) The top left corner contains the geographic location of the map area and the scale of the map.

(2) The top center has the name of the map sheet.

(3) The top right corner contains the map edition, map series, and the map sheet number.

b. Marginal information at the bottom of the map sheet.

(1) The lower left corner of the map contains the legend, the name of the agency that prepared the map, the map

sheet number, and the map sheet name.
(2) The bottom center contains the bar scales in meters, yards, miles, and nautical miles; the contour interval of the contour lines; the grid reference box; the declination diagram; and the G-M angle (mils or degrees).
(3) The lower right corner contains the elevation guide, the adjoining map sheet diagram, and the boundaries box, which shows any boundaries that may be on the map.

What You Should Be Able to Do

1. Identify the sheet name.	P F
2. Identify the sheet number.	P F
3. Identify the contour interval.	P F
4. Identify the G-M angle (mils or degrees).	P F
5. Identify the legend.	P F
6. Identify the bar scales.	P F
7. Identify the declination diagram.	P F
8. Identify the grid reference box.	P F
9. Identify the adjoining map sheets diagram.	P F
10. Identify the elevation guide.	P F

15. Identify 2 of 2 contour lines (shown in brown/red-brown on the map). P F

REFERENCES

FM 21-26 -- Map Reading

FM 21-31 -- Topographic Symbols